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EXAMINER	
CHISDES, SARAH J	

ART UNIT	PAPER NUMBER
2877	

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Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/690,334	KAMERMAN, GARY W.	
	Examiner	Art Unit	
	Sarah J. Chisdes	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 28-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26 and 28-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Amendments

The amendments to the specification and the claims of September 9, 2005 have been received and entered of record into the file.

Specification

As a result of amendment, the objections to the specification are withdrawn.

Claim Objections

As a result of the amendments, the objections to claims 28, 36, 38 and 39 are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 49 and 50 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in the original specification for converting the filtered spectra from an optical signal to an electrical signal and measuring the intensity of the filtered spectra based on the electrical signal, as claimed in claim 49, nor is there support for a step of comparing an electrical signal, whose value is indicative of the measured intensity of the optical signal to a threshold. The only indication of converting an optical signal to an electrical signal is in paragraph 76, page 21 of the specification, where a photomultiplier tube is explained. A

photomultiplier tube ultimately converts an optical signal to an electrical signal, but that property is not explicitly disclosed in the specification. Paragraph 92, page 25 of the specification mentions that the detector transmits a signal indicative of the similarity of the specimen with the substance of interest, but makes no mention of converting the optical signal to an electrical signal, or measuring the intensity of the spectra based on the electrical signal.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10, 17, 33, and 41 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These claims all speak to a variation of time in the similarity signal being indicative of a variation of concentration as a function of distance. The claims from which these depend do not give any indication of a time component that could lead to information about a distance or concentration component. It is unclear to the examiner how the claimed elements can lead to this claimed function. If a pulsed light source or beam splitter and additional detector or other elements are necessary for the device to have this claimed function, they must be added to the claims. New matter may not be added.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Amended claims 1 and 34, and original claims 2 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Hartman (US H780), previously cited.

Regarding claims 1 and 34, Hartman discloses an apparatus with a chemical compound sample (element 12 in Fig. 1, described in column 2 line 32), thereby meeting the specimen limitation of claims 1 and 34, and an optical device to determine the similarity of the spectrum of the specimen to the spectrum of a known substance (column 2 lines 31-45), where light spectra are compared to a matched filter, thereby comparing the light (light spectra) to a representation of a known spectrum (matched filter), and therefore meeting the remaining limitations of claims 1 and 34.

As stated in the previous action, Hartman further discloses, in column 2 lines 43-45, a detector (element 22) and an indicator (element 24) to indicate the presence of the known substance in the specimen, thereby meeting the additional limitations of claims 2 and 3.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Amended claims 11, 35-37 and 42, newly presented claims 43-48, and original claims 4-8, 12-15, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hartman (US H780), previously cited, in view of Freyre (US 5,987,188), previously cited.

As stated in the previous action regarding claims 4-7, Hartman discloses an optical correlator with a Fourier Transform matched filter (column 1 lines 33-34), but does not specify

the other components of the optical correlator claimed in the present application. Freyre, in column 1 lines 26-36, teaches that a classical Van der Lugt type of optical correlator comprises a lens to perform a Fourier transform on an incoming two-dimensional image (as specified in claim 4), the result of which is passed to an optically matched filter (as specified by claim 6); the filter then effectively multiplies the transformed first image with a transform of a reference image (as specified by claim 5, where it is understood that by "transform" Freyre means "Fourier transform", and that the "optically matched filter" is a spatial filter), and passes the resultant beam to a second lens, which then performs an inverse transform on the beam, and focuses the light onto a detector (as specified by claim 7), such that the signal is indicative of the degree of similarity. It would have been obvious to one of ordinary skill in the art at the time of invention to use a well known type of optical correlator, including the Van der Lugt type, which is fully explained in Freyre, in the device of Hartman to facilitate the analysis of a sample. Hartman is silent regarding many of the specifics of the optical correlator used. The teachings of Freyre illustrate the well known specific elements and functions of those elements within an optical correlator about which Hartman is silent.

Claim 11 depends on claim 4, which is rejected above and in the previous action as unpatentable over Hartman in view of Freyre. Claim 11 adds the limitation that the spectral correlator further comprises a spatial filter wherein the filter contains the representation of the second known spectra. Hartman discloses that the correlator contains a Fourier Transform matched filter (column 1 lines 33-34), and further explains in column 2 lines 38-40, that the matched filter contains the "appropriate predetermined pattern . . . for identifying the desired predetermined species". The matched filter is understood to be a spatial filter (since it has two

dimensions, as illustrated in figure 2), and the appropriate predetermined pattern is understood to be the representation of the known spectra, because the device of Hartman is comparing it to spectra from a spectrometer. Therefore Hartman meets the additional limitations of the claim.

As specified in the previous action, claims 12-14, which depend from claim 1, contain the same elements as claims 5-7 and therefore are also rejected on the basis set forth above.

Claims 35-37, as amended, specify the method of using the device of claims 11-14, and therefore are not patentably distinct. Claims 35-37 remain rejected over Hartman in view of Freyre, as set forth above, and as detailed in the previous action.

As specified in the previous action, claims 8, 15, and 39 depend on claims 7, 14, and 37, respectively, which have been rejected above as unpatentable over Hartman in view of Freyre. These claims add the limitation that the specimen is in direct proximity to the optical device. In Figure 1, Hartman discloses the specimen (12) in direct proximity to the spectrometer (10), which is the first part of the optical device, thereby meeting the limitations of claims 8, 15, and 39.

Regarding claim 42, Hartman discloses the use of a spectrometer to produce optical spectra (column 1 lines 55-57) from a sample, thereby receiving light from a specimen and separating it into its component colors (a spectrometer, by definition, separates light into its component colors). Hartman further processes the spectra by comparing it with the image of a known spectra on the matched filter (column 1 lines 59-61), and produces an optical signal indicative of the degree of correlation, which is projected onto a detector (column 2 lines 40-43), thereby detecting the optical signal. Hartman does not explicitly disclose optically multiplying the first spectra with a representation of a known spectra. Hartman is silent regarding the

specifics of the comparison step. Freyre teaches that in a typical optical correlator, light passing through an optically matched filter is effectively multiplied by the image on the filter (column 1 lines 26-32), thereby illustrating that the comparison performed by the filter in the device of Hartman is an optical multiplication, and thereby meeting the limitation of optically multiplying the first spectra with a representation of a known spectra. It would have been obvious to one of ordinary skill in the art at the time of invention to use a well known type of optical correlator, including the Van der Lugt type, which is fully explained in Freyre, in the device of Hartman to facilitate the analysis of a sample. Hartman is silent regarding many of the specifics of the optical correlator used. The teachings of Freyre illustrate the well known specific elements and functions of those elements within an optical correlator about which Hartman is silent.

Regarding claims 43 and 44, Hartman discloses that the output from the matched filter, an optical signal which is the result of the comparison step, is projected onto the detector which will cause an indicator to indicate, via a buzzer or light, that the substance of interest is present (column 2 lines 41-45). Hartman does not explicitly determine the intensity of the signal or compare it to a threshold. However, a signal is sent to an indicator. The received signal must inherently cross some sort of intensity threshold or it would not be sent to the indicator. Therefore the device of Hartman inherently compares the signal to a threshold, and thus meets the limitations of the claim

Regarding claim 45, Hartman discloses an optical correlator wherein light from a chemical compound sample (specimen of the present invention) in a spectrometer is transmitted to a correlator containing a matched filter. If the spectra from the specimen match the known spectra on the filter, an indicator will indicate that the species is present (column 2 lines 32-44).

Hartman does not explicitly disclose that the light from the specimen is optically multiplied depending on a similarity between the spectra from the specimen and the known spectra. Freyre teaches that in a typical optical correlator, light passing through an optically matched filter is effectively multiplied by the image on the filter (column 1 lines 26-32), thereby illustrating that the correlation, or comparison, performed by the filter in the device of Hartman is an optical multiplication. It would have been obvious to one of ordinary skill in the art at the time of invention to use a well known type of optical correlator, including the Van der Lugt type, which is fully explained in Freyre, in the device of Hartman to facilitate the analysis of a sample. Hartman is silent regarding many of the specifics of the optical correlator used. The teachings of Freyre illustrate the well known specific elements and functions of those elements within an optical correlator about which Hartman is silent.

Regarding claim 46-48, Hartman discloses in column 1 line 33-34 that the optical correlator contains a Fourier Transform matched filter for identification of spectra. Because the matched filter contains the Fourier Transform of the known spectra, the filtering step necessarily entails optically multiplying the light with a Fourier Transform of the known spectra, as specified in claim 46. Hartman is silent regarding whether or how a Fourier Transform is performed on the incoming light and whether or how an inverse Fourier Transform is performed on the light after it has passed through the "Fourier Transform matched filter", but such transforms must be performed or it would not be of use to compare the light to a Fourier Transform of the known spectra. Freyre, in column 1 lines 25-32, teaches that a Van der Lugt correlator uses a first lens to perform an optical Fourier Transform on incoming light, as specified in claim 47, and a second lens to perform an inverse Fourier Transform on the light

after it has passed through the matched filter, as specified in claim 48. The Fourier Transform performed by the first lens meets the limitation of claim 46 that the light coming in to the filter is a Fourier Transform of the spectra of the light from the specimen.

Amended claims 18 and 20, original claim 19, and newly presented claim 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hartman in view of Kuderer (US 4,958,928).

Regarding claim 18, Hartman discloses an apparatus with a chemical compound sample (element 12 in Fig. 1, described in column 2 line 32), thereby meeting the specimen limitation of the claim, and an optical device to determine the similarity of the spectrum of the specimen to the spectrum of a known substance (column 2 lines 31-45), thereby meeting the optical device limitations of the claim. Hartman does not explicitly disclose an illuminating device configured to illuminate the specimen. The device of Hartman receives light from a spectrometer, but is silent regarding whether or not the sample is illuminated. Kuderer teaches that known spectrometers can comprise a light source for illuminating the sample (column 1 lines 15-20). It would have been obvious to one of ordinary skill in the art at the time of invention to illuminate the sample to produce a greater amount of light emitted by the sample. An autofluorescence signal is typically very weak, but stimulated emissions or transmission spectra yield a much stronger signal. A stronger signal from the spectrometer would be easier to correlate, yielding a more definitive result. Hartman is silent regarding whether or not the specimen is illuminated. Kuderer teaches that it is know to illuminate a sample when using a spectrometer.

Regarding claims 19 and 20, as detailed in the previous action, Hartman further discloses, in column 2 lines 43-45, an indicator (element 24) to indicate the presence of the known

substance in the specimen, thereby meeting the additional limitation of claim 19, and a detector (element 22), meeting the additional limitation of claim 20.

Regarding claim 51, which is dependent on claim 18, rejected above as unpatentable over Hartman in view of Kuderer, Hartman discloses a device that compares optical spectra from a sample with a matched filter (presumably by sending the light through the filter, or it wouldn't be called a filter) and then outputs an indication of similarity (column 2 lines 34-44), thereby meeting the limitations of the claim.

Amended claims 21-23, 25, 28-29, 31 and original claims 24 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hartman in view of Kuderer as applied to claims 18-20 as above, in further view of Freyre.

Claims 21-25 depend from claim 20, rejected above as unpatentable over Hartman in view of Kuderer. Hartman in view of Kuderer discloses an optical correlator with a Fourier Transform matched filter (column 1 lines 33-34), but does not specify the other components of the optical correlator specified in the present claims. Freyre, in column 1 lines 26-36, teaches that a classical Van der Lugt type of optical correlator comprises a lens to perform a Fourier transform on an incoming two-dimensional optical image (as specified in claim 21), the result of which is passed to an optically matched filter (as specified by claim 23); the filter then effectively multiplies the transformed first image with a transform of a reference image (as specified by claim 22, where it is understood that by "transform" Freyre means "Fourier transform", and that the "optically matched filter" is a spatial filter), and passes the resultant beam to a second lens, which then performs an inverse transform on the beam, and focuses the light onto a detector (as specified by claim 24), such that the intensity of the beam at its focal

point on the detector is indicative of the degree of correlation (as specified by claim 25). It would have been obvious to one of ordinary skill in the art at the time of invention to use any well-known type of optical correlator, including the Van der Lugt type, for the correlation of sample spectra in the device of Hartman and Kuderer to facilitate the analysis of a sample. The combination of Hartman and Kuderer is silent regarding the specific components of the optical correlator that yield the correlation result. Freyre teaches that these components are well known to be part of a typical optical correlator.

Claim 28 is similar to claim 21, but specifies that the spatial filter contains a representation of the known spectrum. A Fourier transform or any transform of a spectrum is a representation of that spectrum, and therefore the limitations of claim 28 are met by Hartman in view of Kuderer in further view of Freyre as set forth above. Claims 29-31, which depend from claim 28, contain the same elements as claims 23-25 are therefore also rejected on the basis set forth above.

Amended claims 26 and 32, and original claim 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schnell (US 4,620,284), previously cited, in view of Hartman, Kuderer, and Freyre.

Schnell discloses an electronic spectral correlator using Raman spectroscopy for qualitative and quantitative analysis of a sample (column 3 lines 18-37). Schnell does not disclose an optical correlator using a Fourier transform lens, a spatial filter, and an inverse Fourier transform lens to perform the correlation. Hartman in view of Kuderer, in further view of Freyre, disclose an optical correlator comprising these elements, as set forth above in regard to claims 25, 31 and 35, on which claims 26, 32 and 40 depend. It would have been obvious to one

of ordinary skill in the art at the time of invention to use an optical correlator in place of the electronic correlator used in Schnell, in order to increase the accuracy of the correlation by using a correlator that is less dependent on precise calibration. (See column 1 lines 31-36 and 46-48 of Hartman.)

As stated in the previous action, claims, 9, 16, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barringer (US 3, 518,002) in view of Hartman and Freyre. Barringer discloses an optical spectrometer to analyze a remote specimen by optically correlating the spectrum from the specimen with spectra from known compounds using a spatial filter (column 1 lines 32-36). Barringer does not disclose the Fourier transform and inverse Fourier transform lenses or the specific series of analysis steps claimed in the present application. Hartman in view of Freyre discloses these specific elements of the optical correlator, as set forth above in regard to claims 7, 14, and 37, on which claims 9, 16, and 38 depend. It would have been obvious to one of ordinary skill in the art at the time of invention to use the optical correlator disclosed by Hartman in view of Freyre in the spectrometer of Barringer in order to make the instrument more versatile by including an easily interchangeable matched filter for correlation with different known substances, and in order to make the instrument easier to use by making it less sensitive to precise calibration.

Response to Arguments

Applicants argue that Hartman fails to disclose all the elements of claim 1, interpreting the correlator to compare an electronic output from the spectrometer to an electronic representation of the known spectra, and thereby not comparing light spectra from the sample to a representation of known spectra. Examiner disagrees and respectfully submits that the device

of Hartman directly compares the light spectra from the sample to the representation on the filter. Hartman consistently refers to the output from the spectrometer as "light spectra" (column 1 line 31, column 2 lines 19, 27, and 40) or "optical spectra" (column 1 line 58), and says in column 2 lines 9-10, that a typical spectrometer produces an "output in the ultraviolet, visible, and infrared", thereby illustrating that the spectrometer is outputting an optical signal. Additionally, Hartman consistently refers to the correlator as an "optical correlator" (column 2 lines 16 and 25). Furthermore, the image from the filter is "projected" on to a detector (column 2 lines 42-43), indicating that light is what is being transmitted, not an electrical or electronic image. An electronic image would not need to be "projected" onto a detector. Examiner contends that the invention of Hartman directly compares the light from the sample (via the spectrometer) to a representation of the second known spectra, and therefore meets all the limitations of claim 1.

Applicants' argument that there is no suggestion to combine the inventions of Hartman and Freyre is based upon the perception that the device of Hartman is analyzing an electronic signal. Examiner disagrees and holds that Hartman is analyzing an optical signal as set forth above, thereby negating the argument. Additionally, the teachings of Freyre are not used to "heal" the device of Hartman, but rather to illustrate the components of a typical optical correlator and their functions about which Hartman is silent.

Hartman does not explicitly state that an optical Fourier Transform is performed on the incoming light spectra (from the sample), but does disclose that the light is compared to a Fourier Transform of known spectra. An optical Fourier Transform must be performed on the incoming light spectra, or the comparison will have no validity. Hartman also does not explicitly

disclose the means through which this optical comparison is performed, other than via a filter.

Freyre, in the background of invention section teaches:

> *The classical Van der Lugt type of optical correlator uses a lens to perform a fourier transform on an incoming two-dimensional image, after which the light beam carrying the transform is caused to pass through an optical matched filter effectively multiplying the transform with a complex conjugate of the transform of a two-dimensional reference image. An inverse transform lens brings the resulting beam to a point or points of focus . . .* (column 1 lines 26-33)

thus illustrating that a well known type of optical correlator (well known enough to be referred to by the name Van der Lugt) consists of two lenses with a matched filter between them, and how each component functions. Freyre teaches that lenses are a well known means of performing an optical Fourier transform, that lenses commonly perform optical Fourier Transforms on the signal both before and after going through the filter in an optical correlator, and that the filter between the lenses effectively performs an optical multiplication of the transformed light with the information on the filter. Hartman is silent regarding the presence of the two lenses, and how each component functions because he assumes that this information would be known to one of ordinary skill in the art.

The arguments regarding the patentability of claim 18 are moot in light of the new grounds of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Witte (US 4,563,090), Ritzl (US 4,609,289), Nelson et al. (US 4,787,750), and Burch (US 4,799,001) disclose spectrometers that contain light sources for illuminating the sample, illustrating that illumination of the sample in a spectrometer is well known.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah J. Chisdes whose telephone number is 571-272-8540. The examiner can normally be reached 8:30am -5pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on 571-272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S.J. Chisdes, Ph.D.
November 30, 2005

Gregory J. Toatley, Jr.
Supervisory Patent Examiner